

**IN THE CLAIMS:**

1. (Currently Amended) Wireless radiofrequency data system comprising:  
a base-station comprising N multiple first sets and a signal processing-unit, wherein each first set comprises a transmitter-and receiver-unit provided with a transmitter and a receiver and at least one antenna which is connected to the transmitter-and receiver-unit, wherein the signal processing-unit is connected with each of the N first sets for processing signals received and to be transmitted by the N first sets and processing signals to be transmitted by the first sets, and  
M multiple seconds sets with N greater than M, wherein each first set and each second set comprises a transmitter-and receiver-unit having at least one antenna and provided with a transmitter and a receiver that operate on essentially the same radiofrequency or radiofrequency-band, wherein and at least one antenna which is connected to the transmitter-and receiver-unit, characterised in that; the signal processing-unit is provided with an inputport for inputting M signals Q to be received by the respective M second sets and comprises information about the transfer-functions H of radiofrequency signals from each of the antennas of the N first sets to each of the antennas of the M second sets and/or vice versa, and wherein the transmitters and receivers, both in the N first sets and in the M second sets, operate on essentially the same radiofrequency or radiofrequency-band; and wherein the signal processing-unit processes the signals received and to be transmitted by the N first sets and processes the signals to be transmitted by the first sets on the basis of said transfer functions H such that for each second set of a plurality of the M second sets an individual communication channel is formed with the base-station wherein these communication channels are generated simultaneously and separately from each other, wherein the processing unit is arranged to process the M signals Q in combination on the basis of information of the transfer-functions H to establish

M of said simultaneous communication channels by processing on the basis of the information about the transfer-functions H, the M signals Q to obtain the N transmit-signals R, to be transmitted by the first sets to the second sets, according to

$$R = P_D Q, \quad (A)$$

resulting in that the M signals Q are received separately by the respective second sets if the second sets each receive the N transmit-signals, where  $P_D = [H^* (H^* H)^{-1}]^T$  is the pseudoinverse of  $H^T$  and where  $H^*$  is the complex conjugated and transposed of H, wherein H is a complex  $[N^* M]$  matrix containing transfer functions  $h_{ij}$  ( $i=1, \dots, N$ ;  $j=1, \dots, M$ ), wherein  $h_{ij}$  is the transfer function for transmission from the  $j^{\text{th}}$  second set of the M second sets to the  $i^{\text{th}}$  first set of the N first sets, and where Q is a complex M dimensional vector  $[Q_1, Q_2, \dots, Q_j, \dots, Q_M]^T$  wherein  $Q_j$  is the signal to be transmitted to the  $j^{\text{th}}$  second set of the M second sets and where  $R = [R_1, R_2, \dots, R_i, \dots, R_N]^T$  wherein  $R_i$  is the transmit-signal to be transmitted by the  $i^{\text{th}}$  first set of the N first sets.

2. (Original) Wireless radiofrequency data communication system according to claim 1, characterised in that, the communication channels are duplex communication channels.

Claims 3-6 (Canceled)

7. (Currently Amended) Wireless radiofrequency data communication system according to claim 106, characterised in that each second set comprises a serial-to-parallel/parallel-to-serial unit, which unit, in use, splits the data signal of said second set in a multiple of signals, an means for modulating these signals on different frequencies according to the Inverse Fast Fourier Transformation, and wherein each first set comprises a unit for executing a Fast Fourier Transformation on the signals received by said first set and means for combining the transformed signals in order to recover said data-signal.

8. (Original) Wireless radio-frequency data communication system comprising in use:  
k<sub>1</sub> multiple first groups, wherein each first group comprises a transmitter-unit and at least one antenna which is connected to the transmitter-unit for transmitting a signal; and  
k<sub>2</sub> multiple second groups, which each second group comprises a receiver-unit and at least one antenna which is connected to the receiver-unit,  
characterised in that, the wireless radiofrequency data communication system further comprises a signal processing-unit which is k<sub>1</sub>>k<sub>2</sub> connected to each of, the first groups and which is, if k<sub>1</sub>< k<sub>2</sub>, connected to each of, the second groups, wherein the signal processing-unit comprises information about the transfer-functions of radiofrequency signals from each of the first groups to each of the second groups, and/or vice versa, and wherein, each of the transmitter-units, of the first groups operates on essentially the same radiofrequency or radio frequency band, and wherein, in use, if k<sub>1</sub>>k<sub>2</sub>, the signal processing-unit processes k<sub>2</sub> data-signals to be transmitted to the k<sub>2</sub> second groups for obtaining k<sub>1</sub> signals which are supplied to the respective first groups to be transmitted, where the k<sub>2</sub> data signals are processed on the basis of said transfer functions in such a manner that the respective second groups will receive separately the respective k<sub>2</sub> data-signals, thereby establishing k<sub>2</sub> simultaneous communication channels, and wherein, in use, if k<sub>1</sub>< k<sub>2</sub>, the signal processing-unit processes k<sub>2</sub> signals, which are received by the respective second groups on the basis of said transfer functions in such way that an estimation is made of the k<sub>1</sub> signals transmitted by the first groups, thereby establishing k<sub>1</sub> simultaneous communication channels.

9. (Original) Wireless radiofrequency data communication system according to claim 8, characterised in that each first group comprises a serial-to-parallel, parallel-to-serial unit, which unit, in use, splits the data signal in a multiple of signals, and means for modulating these signals on

different frequencies according to the Inverse Fast Fourier Transformation, and wherein each second group comprises a unit for executing a Fast Fourier Transformation on the signal received by said second group and means for combining the transformed signals in order to recover said data-signal.

10. (New) Wireless radiofrequency data system comprising:

a base-station comprising N multiple first sets and a signal processing-unit, wherein each first set comprises a transmitter-and receiver-unit provided with a transmitter and a receiver and at least one antenna which is connected to the transmitter-and receiver-unit, wherein the signal processing-unit is connected with each of the N first sets for processing signals received and to be transmitted by the N first sets and processing signals to be transmitted by the first sets, and

M multiple seconds sets with N greater than M, wherein each first set and each second set comprises a transmitter-and receiver-unit having at least one antenna and provided with a transmitter and a receiver that operate on essentially the same radiofrequency of radiofrequency-band and, in use, each of the M second sets transmits a signal so that M signals are transmitted to be received in combination by the N first sets, wherein and at least one antenna which is connected to the transmitter-and receiver-unit, characterised in that, the signal processing-unit comprises information about the transfer-functions H of radiofrequency signals from each of the antennas of the first sets to each of the antennas of the second sets and/or vice versa, and wherein the transmitters and receivers, both in the first sets and in the second sets, operate on essentially the same radiofrequency or radiofrequency-band, and wherein the signal processing-unit processes the signals received and to be transmitted by the N first sets and processes the signals to be transmitted by the first sets on the basis of said transfer functions H such that for each second set of a plurality of the M second sets an individual communication channel is formed with the base-station wherein these communication

channels are generated simultaneously and separately from each other, wherein the signal processing unit is arranged to recover the M signals transmitted by the M second sets separately from each other, thereby obtaining M of said simultaneous communication channels, by processing on the basis of the information about the transfer-functions H, the signals r which are received by the first sets, to calculate an estimation x<sub>est</sub> of the M signals x<sup>c</sup> which were transmitted by the M second sets, according to the mathematical expression

$$x_{est} = P_U r \quad (B)$$

where  $P_U = [(H^*H)^{-1} H^*]$  is the pseudo-inverse for H and where H\* is the complex conjugated and transposed of H, wherein H is a complex [N\*M] matrix containing transfer functions  $h_{ij}$  ( $i=1, \dots, N$ ;  $j=1, \dots, M$ ), wherein  $h_{ij}$  is the transfer function for transmission from the j<sup>th</sup> second set of the M second sets to the i<sup>th</sup> first set of the N first sets, r is a complex N dimensional vector  $[r_1, \dots, r_i, \dots, r_N]^T$  with  $r_i$  the signal received by the i<sup>th</sup> first set of the N first sets, x<sub>est</sub> is a complex M dimensional vector  $[x_{est_1}, \dots, x_{est_j}, \dots, x_{est_M}]^T$  where x<sub>est</sub> is an estimation of x<sup>c</sup>, and wherein x<sup>c</sup> is a complex M-dimensional vector  $[x^c_1, \dots, x^c_j, \dots, x^c_M]^T$ , with x<sup>c</sup><sub>j</sub> being the signal transmitted by the j<sup>th</sup> second set of the M second sets.